



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,993	01/21/2004	Neng-Kuo Chen	JCLA12335	4304
23900	7590	02/13/2006	EXAMINER	
J C PATENTS, INC. 4 VENTURE, SUITE 250 IRVINE, CA 92618			DEO, DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 02/13/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/761,993	<b>Applicant(s)</b> CHEN ET AL.	
	<b>Examiner</b> DuyVu n. Deo	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ji et al. (US 6,787,409) and admitted prior art.

Ji describes a method for forming STI comprising: providing a substrate having a pad oxide 12, a mask 14, and a trench 11 wherein the trench is formed by exposing a portion of the pad oxide and the mask layer (col. 3, line 40-55; col. 4, line 20-23); forming a oxide layer 16 on the trench surface (col. 4, line 38-42); forming an oxide isolation layer by HDP-CVD process to completely fill the trench in two-step process wherein the bias of the second step is higher than the first step (col. 4, line 59-col. 5, line 45); removing the oxide isolation layer over the trench (col. 6, line 1-4). Even though Ji is silent about the deposition to etching ratio of the second step is lower than the deposition to etching ratio of the first step; however, he describes the same process of using a higher bias in the second step, which would provide a lower deposition to etching ratio in the second step. Unlike claimed invention, Ji doesn't describe the steps of removing the mask and pad oxide layer. However, these steps are known to one skilled in the art during the process of forming STI as shown here by admitted prior art, page 2, paragraph [0005] of the specification. One skilled in the art would find it obvious at the time of the invention in

Art Unit: 1765

light of the admitted prior art to further removing the mask and pad oxide layers in order to form a STI with a reasonable expectation of success.

Referring to claims 2 and 4, Ji doesn't describe the first bias power is in the range of 900-2500 W, which would provide a deposition to etching ratio of about 10-20. However, he teaches that the bias varies depending on factors such as thermal oxide layer thickness (col. 5, line 8-10). Therefore, one skilled in the art would find it obvious to determine the bias depending on the thermal oxide layer and through routine experimentation in order to provide optimum bias power and the corresponding deposition to etching ratio to form the isolation with a reasonable expectation of success.

Referring to claims 3, 5, 6 the second bias power is from 1000-3000W (col. 5, line 35-40), which would provide a deposition to etching ratio of about 5-10.

Referring to claims 8 and 9, admitted prior art further describes the mask includes a bottom nitride and a top silicon oxide layers wherein the step of removing the isolation layer over the trench including removing the top oxide layer (page 2, paragraph [0005] of the specification).

3. Claims 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ji and admitted prior art, and further in view of Huang et al. (US 6,653,203).

Unlike claimed invention, above applied prior art doesn't describe a step of etching-back to the mask layer to pull back the mask layer. Huang teaches a method for forming STI wherein he teaches of a step of etching to pull back the mask layer (col. 4, line 29-36). It would have been obvious for one skilled in the art to modify above applied prior art in light of Huang's

Art Unit: 1765

teaching of pull back the mask layer because it would reduce gate oxide thinning when the nitride layer or mask layer is subsequently removed (col. 1, line 45-49).

***Response to Arguments***

4. Applicant's arguments filed 11/28/05 have been fully considered but they are not persuasive.

Applicant's argument that using a higher bias may not directly provide a lower deposition to etching ratio in an HDP-CVD process is found unpersuasive because it still doesn't show any facts that this is the case.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the layers deposited by the first and second stage processes have different etch rates) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Referring to applicant's argument that the oxide liner and bulk oxide layer in Ji have similar etch rates while the layers deposited by the claimed invention have different etch rates, please see col. 5, line 60 where Ji describes the two layers have a different etch rate of about 10%. Therefore, they still have different etch rates.

Referring to applicant's argument that Ji does not removing the mask and pad oxide layer because they are used to form gates of flash memory transistors is acknowledged. However, it is not necessary to be used for forming gates, it also can be simply function as a stop layer for the

Art Unit: 1765

planarization step (col. 3, line 65-66), which is the same function as taught by the admitted prior art (page 2 of the specification, paragraph [0005]).

Applicant's argument that there is no motivation to combine Ji and admitted prior art because Ji describes removing the oxide liner and bulk oxide layer without grooving at the edges of the trench while admitted prior art describe shows a divot around the corner of the trench when removing the mask and oxide layer is found unpersuasive because admitted prior art's embodiment doesn't have the liners layers 16 and 19; however, when the embodiment includes the liners it would solve the problem as shown in paragraph [0007] of the specification. Therefore, there would be no divot or groove formed when removing the mask and pad oxide layer.

Applicant's argument that there is no motivation to combine Ji, admitted prior art and Huang because Huang does not describe about the grooving or divot issue when removing the pad and mask layer or when removing the filling material layer is found unpersuasive because it is not necessary for Huang to describe about the groove or divot in order to be able to combine with Ji and admitted prior art. Huang does provide a motivation to combine, which is pulling back the mask layer to reduce gate oxide thinning when the nitride layer or mask layer is subsequently removed (col. 1, line 45-49). Applicant has not traversed this motivation.

### ***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

Art Unit: 1765

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-2:30 Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner

Duy-Vu N. Deo

2/7/06

